
HAND TRUCK WEIGHING DEVICE AND WEIGHING METHOD

Cross-Reference to Related Application

[0001] This application claims the benefit of priority to U.S. provisional patent application serial number 60/418,131, filed on October 12, 2002, now pending.

Field of the Invention

[0002] The present invention relates to devices and methods of weighing.

Background of the Invention

[0003] Hand trucks are used to move objects from one location to another. Often, a hand truck will be used to lift a pallet, on which may be placed a heavy object, and move the pallet to a desired location. Figures 1 and 2 are schematic representations of a prior art hand truck. Typically, a hand truck 8 has two toe portions 10A, 10B each having a roller 13. Each roller 13 often has bearings disposed about an axle and one or more wheels 16. Sometimes, a wheel 16 will be a metal cylinder. The bearings allow the wheel 16 to rotate about the axle and also support the weight of an item supported by the hand truck 8. Such hand trucks 8 also typically have a third roller 14, which may be used to guide the hand truck 8 in a desired direction, and support the weight of an item supported by the hand truck 8. The guide roller 14 can be turned by a handle 19, in order to guide the hand truck 8 in a direction desired by the operator.

[0004] Some hand trucks 8 have a hydraulic cylinder, which may be used to raise and lower the toe portions 10A, 10B. If the toe portions 10A, 10B are inserted into a pallet, the operator may raise the pallet by pumping the handle 19 attached to the hydraulic cylinder. The handle 19, guide roller 14 and cylinder may be connected to a support structure. Often, the support structure is referred to as a "bulkhead" 22.

Summary of the Invention

[0005] The invention includes a hand truck having a first toe-portion, a second toe portion and a bulkhead. The first toe portion has a first roller and a first weight sensor. The

second toe portion has a second roller and a second weight sensor. The bulkhead connects the first toe-portion and the second toe-portion, and the bulkhead has a third roller.

[0006] The invention also includes a method of weighing. A hand truck may be provided, and an object may be supported by the hand truck. A weight sensor in the a toe portion of the hand truck may provide a weight-signal, and a weight corresponding to the weight-signal may be displayed.

Brief Description of the Drawings

[0007] For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

- Figure 1 is a plan view of a hand truck;
- Figure 2 is a side view of the hand truck depicted in Figure 1;
- Figure 3A depicts a roller according to the invention;
- Figure 3B depicts another roller according to the invention;
- Figure 4 depicts a hand truck according to the invention;
- Figure 5 is a schematic of a system according to the invention; and
- Figure 6 is flow chart of a method according to the invention.

Detailed Description of the Invention

[0008] With reference to Figure 1, Figure 2, Figure 3A and Figure 3B, an embodiment of the invention is a hand truck 8, which may include a first toe-portion 10A, a second toe-portion 10B and a bulkhead 22. The bulkhead 22 may connect the first toe-portion 10A and the second toe-portion 10B. The first toe-portion 10A may have a first roller 13 and a first weight sensor 25. The second toe-portion 10B may have a second roller 13 and a second weight sensor 25. The bulkhead 22 may have a third roller 14. The bulkhead 22 may also have a third weight sensor 25. If the third weight sensor 25 is provided on the bulkhead 22, a weight sensor 25 on the third roller 14 may not be needed. A Wheatstone bridge may serve as one or more of the weight sensors 25.

[0009] With reference to Figure 3A, Figure 3B and Figure 4, any of the rollers 13, 14 may have an axel 28 and a wheel 16 disposed about the axel 28. Bearings 31 may be used to support the axel 28, for example with the toe portion 10 or bulkhead 22, as the case may be. The wheel 16 may rotate about the axel 28 and also support some or all of the weight of an object supported by the hand truck 8. In such an arrangement, the weight sensor 25 may be arranged so as to sense the weight carried by the axel 28. For example, the weight sensor 25 may be mounted to the axel 28. A weight sensor 25 may also be placed on the bulkhead 22. *See Figure 4.*

[0010] A hand truck 8 according to the invention may have a handle 19 joined to the third roller 14, for example via a mechanical linkage. The third roller 14 may be capable of swiveling in response to changes in a position of the handle 19. For example, if the handle 19 is moved to the left of the bulkhead 22, the third roller 14 turns left.

[0011] A device according to the invention may have a microprocessor 34 in communication with the weight sensors 25. *See Figure 5.* The microprocessor 34 may be capable of receiving a weight-sensor-signal from one or more of the weight sensors 25. The weight-sensor-signal may correspond to the weight sensed by the corresponding weight sensor 25. For example, the weight-sensor-signal may indicate the weight supported by the structure to which the weight sensor 25 is attached. The microprocessor 34 may be capable of determining a sum, which may be determined by adding the weight sensed by the first weight sensor 25 and the weight sensed by the second weight sensor 25, and any other weight sensors 25. In this manner, a total weight carried by the hand truck 8 may be determined.

[0012] The hand truck 8 may include a display 37, such as a liquid crystal display or light emitting diode display. The display 37 may be in communication with the microprocessor 34, which may provide a sum-signal to the display 37. Upon receiving the sum-signal, the display 37 may provide a person with information corresponding to the weight being carried by the hand truck 8 and sensed by the weight sensors 25. The microprocessor 34 and display 37 may also cooperate to provide a person with information corresponding to the weight being sensed by one of the weight sensors 25, or the sum of the weight being sensed by any combination of the weight sensors 25.

[0013] In a method according to the invention, the weight being carried by a hand truck, or a portion of the hand truck, may be determined. Referring to Figure 6, in such a method a hand truck 100 is provided. The hand truck may have a first toe-portion, a second toe-portion and a bulkhead, which connects the first toe-portion and the second toe-portion. Each toe-portion may have a weight sensor mounted thereon. An object may be supported 103 by the hand truck. Each weight sensor may produce 106 a weight-signal, which corresponds to the weight being supported by that portion of the hand truck associated with the weight sensor. Each weight-signal may be received 109, for example by a microprocessor. The microprocessor may provide 112 an information-signal to a display in order to cause the display to provide 115 information corresponding to at least one of the weight signals. The information provided by the display may be a number representing the weight corresponding to a sum of weights indicated by the weight-signals.

[0014] Although the present invention has been described with respect to one or more particular embodiments, it will be understood that other embodiments of the present invention may be made without departing from the spirit and scope of the present invention. Hence, the present invention is deemed limited only by the appended claims and the reasonable interpretation thereof.